SOIL SURVEY OF COLUMBIA COUNTY, GEORGIA.

By CHARLES N. MOONEY and ARTHUR E. TAYLOR.

DESCRIPTION OF THE AREA.

Columbia County lies along the Savannah River, on the eastern boundary of the State of Georgia, just north of Richmond County. Little River, which empties into the Savannah, separates it from Lincoln County on the north. It is bounded on the west by McDuffie County. The area of the county is 313 square miles, or 200,320 acres.

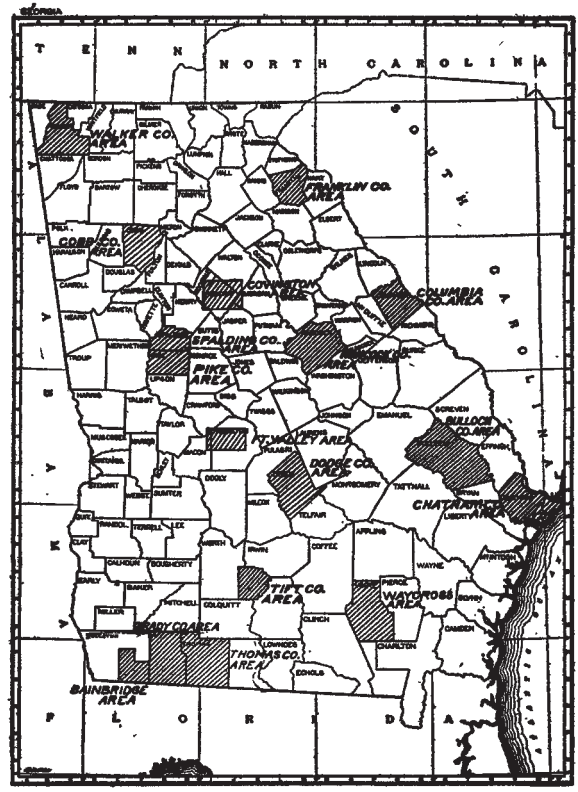

FIG. 14.—Sketch map showing areas surveyed in Georgia.

The surface features of the county are varied, as it lies in two distinct physiographic provinces—the Piedmont Plateau and the Atlantic Coastal Plain. The former is the remnant of a high mountainous region reduced by erosive agencies first to a peneplain and then to a dissected plateau, with ridge crests 500 to 600 feet above sea level. The latter comprises a belt of country representing part of the sea floor during an earlier period and formed of materials eroded from the Piedmont section and carried into the sea by drainage waters.

The Piedmont section covers fully three-fourths of the county, the Coastal Plain extending along the southern border. In detail the topography of the Piedmont section consists of a series of six broad

ridges, separated by the valleys of the larger streams and having a northeast and southwest trend. The broad ridge crests have a rolling surface, into which the small branches have cut back at right angles to the general axis, forming sharp spurs. As the larger creeks and the Savannah River are approached the surface becomes more dissected and broken, making the valley slopes rather abrupt. To the west, along the county line between Columbia County and McDuffie County, there are large areas of rolling land.

The small streams in the Piedmont, descending rather rapidly in their upper courses, cut narrow valleys, whose slopes soon become steep. The main streams flow through valleys from 300 to 400 feet below the crests of the ridges. The streams are still cutting their channels and no extensive flood plains exist. Narrow strips occasionally occur along the larger streams and branches. These are all subject to annual overflow.

Along the Savannah the flood plains, which are narrow and not continuous, rise from 10 to 25 feet above the river and are subject to overflow only at times of exceptionally high water. The largest area of bottom land occurs along the Savannah at the point where Kiokee and Little Kiokee Creeks empty into the river. This flood plain is continued by Waltons Island, formed of flood-borne material and separated from the mainland by a small division of the Savannah known locally as the Little River.

Standing on the crest of any of the ridges, it will be noticed that they are all of the same general level (the level of the ancient peneplain), though there is a slight dip to the southeast. A prominent topographic feature of the Piedmont section is Birch Mountain, situated in the northeastern part of the county—a narrow, sharp mountain ridge rising 200 to 300 feet above the general surrounding level. It owes its existence to the more resistant character of the rocks composing it.

The Coastal Plain section on the southern border of the county consists of a main watershed for streams flowing northeast through the Piedmont section and those flowing south. The elevation of the crest of the divide in the western part reaches 500 feet and is very little below the general elevation of the Piedmont section, gradually descending to the southeast.

The trend of the divide for a short distance east of Berzelia is to the northeast. To the west an arm extends up along the boundary of the county to the vicinity of Harlem. The Coastal Plain here is several miles wide, gradually narrowing to the east, where it leaves the county a little over a mile from the Savannah River. The crest of the divide and the spurs extending from it have a flat to rolling or billowy surface. On each side the ridge drops abruptly, the upper courses of the streams having cut back deeply into the surface. Par-

ticularly noticeable are the amphitheaterlike places where streams head, in which occur a number of seepage depressions or ravines converging like the ribs of a fan at nearly the same point to form the main branch.

On the north side of the divide is a sharply sloping escarpment falling about 100 feet and then continuing in a gentle gradient to the streams. From the lower part of this escarpment the Coastal Plain materials have been removed by erosion and the underlying Piedmont formations exposed. Seen from the north the Coastal Plain section has the appearance of a sand-hill region and is known locally as such, but viewed from the crest of the divide itself the section to the south has the appearance of a stream-dissected plain.

North of Harlem and east to Grovetown, in the Coastal Plain section, is a disconnected series of hills rising from 25 to 100 feet above the general surrounding levels, capped with ferruginous sandstones, their tops lying at about the same elevation as that of the ridge at Harlem.

Columbia County lies in the drainage basin of the Savannah River, which flows along its eastern boundary. This stream receives directly all of the drainage water of the county, except a small part near the southern boundary, which flows south and finally reaches the Savannah lower down.

Little River, which forms the northern boundary of the county, empties into the Savannah and drains the extreme northern section of the area. The main creeks within the county are Kegg, Kiokee and Little Kiokee, and Uchee. These, with others of lesser size, have a general northeasterly course. They all have numerous minor tributaries. The county is thus well watered. It also has excellent drainage throughout.

The surface run-off, especially in the Piedmont section, is rapid and causes considerable damage through erosion on the slopes. The streams are still cutting channels and their flood plains, while not thoroughly drained, are not swampy, in contrast to the streams in the Coastal Plain section. The latter, instead of flowing in well-defined channels, spread over narrow valley floors, the drainage being largely lateral seepage.

Along many of the Piedmont streams water powers are available and the Savannah in its course along the county line is a series of rapids on which large power projects might be developed. Near the point where the river leaves the county it is dammed and a canal carries the water to Augusta, 6 miles away, to form the town water supply.

Through the county are numerous springs, which are used to furnish the domestic water supply wherever convenient.

The settlement of this part of Georgia followed closely that of the earliest settlement in the State, which occurred at Savannah. As early as 1736 a garrison of English troops was stationed at what is now Augusta and a trading post established. Actual settlement soon followed, gradually extending from Augusta as a center, and what is now Columbia County had scattered settlers along the Savannah River at a very early date. The first immigrants were English, but later some Scotch-Irish came from the older settlements in the Carolinas, Virginia, and Maryland.

Originally all the country around Augusta was included in St. Pauls Parish, which was separated into counties after the Revolution. In 1790 Columbia County was laid off from Richmond. It contained a much larger area than at present, territory later being segregated to form parts of the present adjoining counties. Some time prior to the Revolution the land of the county had been pretty largely taken up by settlers, and by 1800 the census showed a population for the then area of the county, which included most of what is now McDuffie, of 8,345. Within the next decade it gained about 3,000, since which time the number has changed very little, the present population (1910) being 12,328, an increase of about 1,600 during the last 10 years.

A large proportion of the early population was negro, and so continues. The present white population is largely descended from the early settlers, many of the old plantations still being held by the descendants of the earliest owners.

Appling, centrally located and 10 miles distant from Harlem and Grovetown, the main railroad points in the area, is the county seat. Both the latter towns are situated in the southern part of the county, on the Georgia Railroad. Evens, in the southeastern part, is the principal town on the Charleston & Western Carolina Railway. Winfield and Leah are small villages in the northern section of the county.

Two railroads furnish transportation facilities to the southern and southeastern parts of the county. The northern part is less fortunate. The Georgia Railroad passes through the extreme southern part of the county from Augusta to Atlanta and Macon direct, and gives local accommodation service to all stations between Augusta, Grovetown, and Harlem, the former 15 miles and the latter 25 miles from Augusta. The Charleston & Western Carolina passes through the southeastern part of the county, connecting Augusta with Columbia and Charleston, S. C. It gives good service. Augusta is the local market for the produce of the farms, with the exception of watermelons and peaches, which are shipped to northern points.

The country roads are numerous and under the present road-working system are being rapidly improved. There are now several miles

of sand-clay road completed and in excellent condition, and it is believed in time this type of road construction will extend to all parts of the county. Rural telephone lines are being extended, and the rural free delivery service is rapidly being enlarged to include all parts of the county.

CLIMATE.

As no climatological observations have been taken or recorded within the county, the records from the Weather Bureau station at Augusta, the station nearest the county, have been given in the accompanying table. These in general will show the climatic conditions prevailing in the area, although some differences must exist, Augusta being located in a valley, while the most of Columbia County is at a considerably higher elevation. The temperature at Augusta, especially in summer, would be expected to be somewhat higher and greater humidity would in all likelihood prevail.

The following table shows the normal monthly, seasonal, and annual temperature and precipitation and the occurrence of killing frosts in spring and fall at the station mentioned:

Normal monthly, seasonal, and annual temperature and precipitation at Augusta.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	°F.	°F.	°F.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
December	48	78	7	3.4	1.2	4.0	0.3
January	47	80	6	4.2	7.8	3.4	0.1
February	50	84	3	4.5	3.0	7.2	0.5
Winter	48			12.1	12.0	14.6	0.9
March	56	89	14	4.9	4.6	7.8	Trace.
April	64	93	29	3.6	1.3	6.2	0.0
May	72	100	41	3.3	3.0	3.9	0.0
Spring	64			11.8	8.9	17.9	Trace.
June	79	103	46	4.6	4.8	3.3	0.0
July	81	105	57	5.2	4.1	5.4	0.0
August	80	105	58	5.6	2.5	6.8	0.0
Summer	80			15.4	11.4	15.5	0.0
September	75	101	41	3.7	5.5	6.8	0.0
October	65	94	32	2.5	0.3	1.1	0.0
November	55	85	22	3.0	1.3	2.2	0.0
Fall	65			9.2	7.1	10.1	0.0
Year	64	105	3	48.5	39.4	58.1	0.9

Average date of first killing frost in fall, November 9; of last in spring, Mar. 18. Date of earliest killing frost in fall, Oct. 8; of latest in spring, Apr. 16.

As will be seen by reference to the table, a generally mild, temperate climate prevails over this section, the mean annual temperature for the county being about 64° F. The winters are generally pleasant, with only occasional cold spells of short duration, when the temperature falls below freezing, though rarely near zero. There is some snowfall, averaging scarcely 0.9 inch per year, and it is said that a number of years may pass without even flurries of snow.

The average growing season—the period between the average dates of killing frosts in spring and fall—is seven and one-half months. The season is always more than sufficient to mature all the crops grown or which may reasonably be produced in this part of the country.

The mean annual rainfall amounts to 48.5 inches at Augusta and varies only about 10 inches either way in the wettest and driest years so far of record. As shown by the table, the rainfall is well distributed throughout the year, the greatest precipitation being during the summer months.

The climate is generally healthful, in fact, the lower part of the county is in the sand-hill region around Augusta that has become so widely known for its genial winter climate and healthfulness and is now attracting the attention of northern tourists.

AGRICULTURE.

The early settlers of Columbia County devoted themselves entirely to agriculture and by the outbreak of the Revolutionary War all of the lands in the county were occupied, generally by large plantations. These were worked by slave labor, which had been introduced in 1750.

In the early days stock raising received considerable attention, sheep being raised for wool for home consumption, and cattle for hides and beef. The cereals were grown to supply the home needs, and in general the plantations were practically self-supporting.

Later, with the introduction of slave labor, cotton became the money crop. Augusta was the principal center for trading in this crop, being favorably situated at the head of navigation on the Savannah River. In 1850 the production of general crops, with the exception of cotton, was much in excess of the present figures, the output of wheat, corn, and oats being fully three times that shown for the county in the census of 1900. The area of the county was larger, however, than it is now.

During the Civil War production of all crops came to a standstill, and at its close, with the loss of slave labor, many of the large plantations were in part abandoned, the fields becoming overgrown with weeds and brush and finally reverting to forest. The high price of cotton following the close of the Civil War stimulated its

production and resulted in the adoption of a one-crop system of agriculture, which still continues.

As late as 1880 census figures showed practically one-half of the improved land of the area devoted to cotton. In 1889 the output was 10,007 bales of 500 pounds, the yield averaging a little less than one-third bale to the acre. Since that time the acreage devoted to this crop has still further increased.

Corn ranks second in importance, the production in 1889 being 130,910 bushels and the yield averaging less than 10 bushels to the acre. The acreage of this crop has declined steadily since 1850. The farmers now give their attention principally to cotton, few of them growing enough corn for home requirements, preferring to import this article from the West.

Oats are sown on nearly all the plantations, although the acreage is small and the average yield low. With the use of fertilizer as high as 50 bushels per acre have been secured on some of the better lands.

Small patches of wheat are seen in the Piedmont section, although the yields are low and it is not considered a paying crop. Rye is met with occasionally, but is not in much favor. This makes a good winter cover crop and merits more attention, particularly on the poorer soils, as it will grow under conditions unfavorable to other crops.

Cowpeas are the principal forage crop, and they are also grown for the seed. This crop is not used as generally as it should be, though there is a present tendency to increase the acreage. Planters depend a good deal on hay shipped from outside points to feed their work stock during the cropping season. This should be grown on the farms. Some crab grass is cut for hay, which is of good quality. This is a volunteer growth that comes up after such cultivated crops as corn and potatoes are "laid by" and in wet seasons produces good yields. A part of the oat crop is cut green and cured for hay instead of allowing it to ripen.

Sweet potatoes are grown universally but hardly in sufficient quantities to meet the local demand. Small patches of Irish potatoes are also grown, and a garden is found on nearly every farm in which the standard vegetables are produced for home consumption.

There are some peach orchards in the county in both the Coastal Plain and the Piedmont hill sections. Only a few growers give any particular care to the trees, and these are apparently successful. The Elberta is grown to the exclusion of other varieties in the commercial orchards. In small plantings around the farmsteads the Snelling is most common. This variety makes a thrifty growth and bears heavily, though the fruit is generally of inferior quality and not adapted to shipping.

In the Coastal Plain section farms are much smaller than in the Piedmont region and are occupied generally by the owner. These farmers generally produce enough corn and other subsistence crops to supply their needs and grow cotton as a surplus crop, the acreage to cotton being relatively small. The small farmers are, as a rule, successful.

In this section the production of watermelons is followed on considerable acreages convenient to shipping points on the railroads. The crop is sold to local buyers, no risks are taken by the grower, and a fair return is obtained. The average production is about one-third carload of first-grade melons per acre, and quite commonly a yield of one-half carload per acre is secured. The chief difficulty to contend with in growing the crop is the wilt disease, which makes it impossible to use the same field for melons more than once in a period of several years.

In the eastern part of the area some vegetables and berries are grown for the Augusta market, but the distance is too great to make the business very profitable, the haul and shipping materially reducing the net returns.

Sugar cane is grown in the Coastal Plain section on the moist lands, but only in small patches and for the purpose of supplying the table with sirup.

Under the prevailing one-crop system very little attention is or indeed can be given to adaptation of the soils to crops. Corn does best on creek-bottom lands where the soil is dark with humus, friable, and of good moisture conditions. All such lands sufficiently drained are utilized for this crop to the practical exclusion of cotton. The yields here are as much as 50 to 100 bushels per acre, while the upland soils yield from 10 to 50 bushels.

Several varieties of short-staple Upland cotton are grown. The small-bolled varieties, particularly the Peterkin, do better and are a surer crop on the poorer upland soils. The big-bolled varieties find favor and do best on the red clay lands of the Piedmont section. Piedmont lands with red clay subsoils, originally the hickory and oak lands, are considered the strongest soils, while the gray soils with yellow or mottled subsoils are not considered quite so good, and as a rule do not quite equal the average cotton yield on the lands with red subsoils.

In the Coastal Plain sections the nearer the clay is to the surface the more productive the land, the nearness of the underlying clays having a marked influence on moisture conditions and the maintenance of organic matter in the soils.

With the tenant system and the general cropping practice the rotation of crops is given attention only by a comparatively few landowners. Cotton and corn are grown year after year upon the same

land. The tenants' efforts are directed to cotton production almost exclusively, and usually the landowner approves of the practice, as he is more certain of an income, with the class of labor employed, for the use of the land for cotton than in case of any other crop. The negro and his family can all be employed to best advantage in cotton growing.

Some landowners are giving attention to crop rotation and gradually extending the practice over the whole plantation. Corn is followed with oats in the fall and after harvesting cowpeas are sown. These are picked for the peas or cut for hay and followed by cotton. This makes a good rotation, though in the corn crop peanuts and velvet beans could be planted between the rows, getting the benefit of their stores of nitrogen and furnishing feed for cattle and hogs after the corn crop is harvested. This practice is followed in parts of southern Georgia and has done much to improve the lands and supply needed forage.

With clean cultivation of crops such as cotton, the land lies bare during the winter and is subject to great damage by washing and gullying during the heavy rains of this period. To prevent this, it is advisable to grow winter cover crops, such as rye or crimson clover, which, in addition to the protection they afford, supply some winter pasturage.

On account of the high price of flour, wheat should form a small-grain crop in rotations, especially on the heavier soils of the Piedmont region. The benefits resulting from crop rotation would insure better yields of this crop than are at present secured.

A great advance has been made in farm practices in the last few years and up-to-date methods are rapidly being employed. Old methods still survive in many sections, especially among the negro tenants. The small one-horse plow capable of stirring the soil to the depth of only 3 or 4 inches and the narrow-tooth implements with sweeps used in aftercultivation are gradually giving way to the two-horse turning and disk plows and harrows in the preparation of the land and to the multiple-toothed cultivators for the afterworking of the crops. The use of improved farm implements of all kinds is meeting with general favor and they are being introduced rapidly over the county. The tenants are receiving closer supervision and landlord and tenant working together are putting the land in better shape for crops. Subsoiling is gradually coming into use on farms with heavy subsoils and much benefit is reported from the practice.

The common method of preparing land for cotton is to make a succession of beds by throwing furrows together. A few planters are beginning to plant the crop on a level surface and to use weeders to prevent a crust from forming, to keep down weeds, and to conserve the soil moisture. Cotton is given clean cultivation by repeated

hoeings. Corn is not given so much care, the work being reduced to a minimum. Two ways of planting are employed. In one the seed is dropped in beds like cotton; in the other it is placed in deep water furrows. The latter is now the most common and the better way, the soil being gradually thrown to the corn as it grows and the weeds readily covered. Contour farming is general, as all slopes wash easily where clean-cultivated crops are grown. In addition to contouring, sidehill ditches and terraces are employed, but this has the disadvantage of occupying too much ground and if care is not taken more damage results when the water breaks through than would be the case in deeply plowed fields handled on the contour plan. The growing of cover crops and deeper plowing and the incorporation of organic matter in the soil to increase its capacity for water would meet the requirements on all areas except those of very steep slope.

Fertilizers are used without exception for cotton, generally for corn, and to some extent for oats. This is supplemented with what barnyard compost can be made. Raw cotton seed is used to some extent. Complete fertilizers are generally used, cottonseed meal mixtures being the most popular and generally used. A number of fertilizer formulas ranging from 8–2–2 to 9–2–3 and 10–2–2 are in general use. The 8–2–2 formula has been the most commonly used, but many planters are applying mixtures of higher grade, believing that better results are obtained. This can not be stated definitely, as rarely are different formulas used side by side to get comparative results.

Acreage applications range from 100 to 500 pounds, the average being 150 to 200 pounds for cotton and 100 to 150 for corn.

The fertilizer is placed in the bed or furrow either before the bed is formed or when it is opened a few days before planting. A few growers give side applications during the season, especially of nitrogenous fertilizers. The barnyard compost is drilled in along the furrow, the quantity not being sufficient to broadcast over the fields. On lands with clay close to the surface the proportion of the phosphate fertilizer ingredient should be high to hasten maturity. The clay as a rule contains a good supply of potash and this ingredient need not be supplied in large quantities, except to prevent rust. On the deep sandy lands the proportion of potash should be liberal. Every effort should be put forth to supply at least the greater part of the nitrogen by growing and turning under leguminous crops. Aside from their stores of nitrogen, these crops supply the organic matter so lacking in all the soils of the county, enabling them to hold moisture and improving their tilth and general condition.

The negro population supplies the larger part of the labor. For the ordinary staple crops they are efficient, though as a class they are

not skillful in caring for more intensively cultivated crops. They are gradually drifting from the plantations to work in the towns and cities. Little labor is hired by the day or season, though some is used where owners operate a portion of the farm themselves. In this case they get a stipulated wage, together with rations, a cabin, garden patch, and fuel. During cotton chopping and hoeing every available hand, male and female, finds employment, and in the picking season the women and children are all utilized, the pay being for weight of cotton picked at a stipulated price per hundredweight.

The tenant system is universal and is probably the more satisfactory way of using the labor under existing conditions. The owner usually retains the right to direct the operation, so that a sufficient crop is insured to cover the rent. Land is customarily rented for a share of the crop, the proportion varying according to conditions. Usually, when the owner furnishes the land and one-half the fertilizer, the tenant furnishing the other half, the working stock, and all the labor, the crop is equally divided. Under another system the tenant gives so much cotton as a "standing rent" for a certain piece of land. The unit is the one-horse farm, which averages from 20 to 30 acres. For this the tenant gives from 1 bale to 2 bales rent, according to the productiveness of the land. There is a tendency to reduce the size of the tenancies and to work the land more intensively. Frequently the owners employ an overseer, who superintends the operation of a part of the plantation with paid hands and directs the work of the share tenants. On some of the large plantations this makes it possible to use the most modern farming implements, and this, together with large applications of fertilizers, gives better results. Plantations of this class are gradually being built up and improved. The percentage of farms operated by the owners directly is small, the last census showing only 20.4 per cent managed in this way. There has been a decided decrease in this respect in the last 30 years, the number of owner-operated farms in 1880 being 42.4. Along with this change there has been a general movement of the landowners to the towns. According to the census the average farm in 1880 contained 227 acres; in 1890, 121 acres; and in 1900, 95.5 acres.[1] The size of farms varies greatly. In general they are large, most of them containing more than 200 acres, while there are several very large plantations. As a whole the farms are too large for best results. In the Coastal Plain section, especially in the better districts near the railroad, the holdings are smaller, and largely operated by the owners.

About one-half the acreage in farms is classified by the census as improved. This proportion has been maintained for some time, though in 1880 the proportion was only a little more than one-third.

[1] The census of 1900 counted each tenancy as a "farm."

There is considerable wooded land in the county, especially in the poorer sections. The greater part of the marketable timber has been removed, though some tracts are still held intact.

The red lands of the Piedmont section originally supported a heavy growth of hardwoods, consisting of hickory and oak. Later abandoned areas were taken possession of by old-field pine. In the northern part of the county there were some areas of virgin longleaf pine. Forests of this tree were, however, largely confined to the Coastal Plain section. Where these have been cut off, shortleaf pine and scrub oak have come in. The second-growth pine is of little value for timber, but is in demand for firewood, and as the country is cleared its value will increase. Locust was formerly quite common in the Piedmont section. This tree should be protected and planting extended on account of its value for fence posts.

The high price of cotton during the last few years has put the landowners in a good financial condition. This is reflected in the improvements taking place on owner-operated farms. Commodious, modern houses are being built. Generally the farms are unfenced, as the law requires stock to be confined. Some fencing is being done, however, and indications point to the practice becoming general.

Land values have rapidly advanced in the last few years, the average value of farm lands being about $15 to $20 an acre. Much land in the best situations and with good improvements is held at higher prices, values running as high as $50 an acre.

The greatest problem of the Columbia County farmers is the improvement of the soils. These have been cropped injudiciously for a long period of years and are in a generally impoverished condition. This is not due to a depletion of plant food, as no doubt these soils have a good reserve supply, but is the result of continued cropping, with a loss of organic matter and the production of poor physical conditions generally. The greatest need in the management of these soils is to plow deeper; to prepare the seed bed more thoroughly, so as to admit more water to it; and to open up the soil for aeration and oxidation. Then, with the incorporation of humus, in which the soils as a whole are deficient, the tilth will be improved, the water will be taken up and held instead of being allowed to rush off down the slope, carrying the soil with it, plant food will be elaborated as the crops need it, and the soils will respond more readily to applications of fertilizers. The problem is more one of management in restoring organic matter and improving tilth than of adding plant food.

The great variety of soils and range of crop adaptation warrant the building up of a system of diversified farming. Several lines of opportunity invite the farmers of the county. The general farming should include the production of more stock. The more remote and hilly lands, except where best used for forestry, should be devoted to

FIG. 1.—CABBAGE PALMETTO, A COMMON GROWTH ON THE PLUMMER FINE SANDY LOAM.

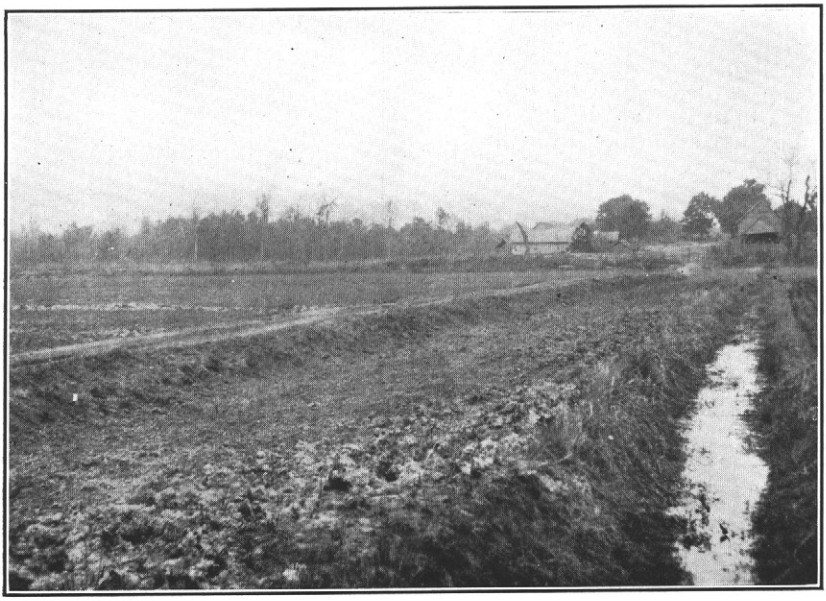

FIG. 2.—RICE FIELDS IN ALTAMAHA RIVER BOTTOM (GEORGETOWN CLAY). BUILDINGS ON SANDY UPLAND.

grazing. In the Coastal Plain section there is opportunity for the development of truck growing, the soils being adapted to this type of agriculture and the section having the requisite facilities for quick shipment.

SOILS.

The soils of Columbia County may be separated, according to mode of origin, into residual, sedimentary, and transported. The two former are upland soils; the latter bottom-land soils. The first belongs to the Piedmont Province, the second to the Coastal Plain, and the third to the River Flood Plains Province.

Separation of the individual soil types has been made upon the basis of difference of texture and structure of the soil material to a depth of 36 inches. Exclusive of Rock outcrop and Swamp, 26 distinct soil types were mapped in Columbia County. These have been grouped into soil series, in which are included those individual types of like general characteristics, such as derivation and topography of the subsoil, and color of both soil and subsoil.

A complete series would include all the soil textures from the coarsest to the finest, but as found in Columbia County no soil series is complete, the range in texture being from coarse sand and sandy loam to clay loam, all the sandy loam classes being found in the Piedmont soils.

The Piedmont section is the remnant of a high mountainous region eroded to a low dissected plateau. The formations consist of igneous, metamorphic, and crystalline rocks of pre-Cambrian age. There is a considerable variety of gneisses, schists, and granites. Veins of quartz permeate these larger rock masses. The soils have been derived through disintegration and decomposition of these several rock formations, which, varying from coarse to fine in texture, give corresponding differences in the materials resulting from their breaking down. As will be seen by reference to the map, the coarse-textured soils cover about three-fourths of the Piedmont section, extending from the boundary of the Coastal Plain well up to the northern part of the county. Granitic gneiss is the most common rock, with intrusions of coarse granite and some schist. Along Little River the rocks are nearly all finely crystalline chlorite schists giving rise to very fine textured sandy surface soils, while between the fine and coarse belts occur rocks of intermediate textures and similar textured soils.

The rocks of the Piedmont section give rise to 13 soils, which have been grouped in three soil series. Of these the Cecil soils—a series extensively developed throughout the Piedmont section and known widely as red lands from the color of the soil or red subsoil—are important types. Locally the clayey members are red from the surface

downward, while the sandy members are brownish gray on the surface and underlain by the typical red clay. These are the most productive of the Piedmont soils. They are known locally as "hickory and oak" land, having originally supported heavy growths of these trees.

The Appling soils constitute a new series, having been first recognized and mapped in Columbia County. They differ from the Cecil series in having a mottled red and yellow subsoil rather than a uniform red. It is, moreover, somewhat less friable than the Cecil subsoil. There are five types in this series, ranging from a coarse sandy to silt loam.

The Iredell series is represented by three types. Its characteristics are an impervious waxy clay subsoil of greenish-yellow color, with a greenish sandy surface covering. These soils are apparently derived principally from diorite and hornblende schist. The stony loam of the series covers Birch Mountain. The coarse sandy loam is the most extensive, while the fine sandy loam is developed in only two small areas.

The soils classed as sedimentary in this report are derived from Coastal Plain sendiments laid down on the ancient sea floor or along its coast.

The Norfolk series covers the most of the Coastal Plain section of the county. Four types of this series, a coarse sand, a coarse sandy loam, a sand, and sandy loam, are shown in the map. The basis of separation of the sands from the sandy loams is the depth of the sand mantle over the yellow sandy clay subsoil; where the latter is found within 36 inches the area is classed as sandy loam. The presence of clay within this depth has a marked effect upon the productiveness of the soil, and consequently upon land value. These coarse Norfolk soils, as developed along the southern border or sand-hill section of the county, are characteristic of the sand-hill belt, which extends southwesterly for a considerable distance and northeasterly across South Carolina and North Carolina.

Closely related to the Norfolk series are the Tifton soils, distinguished largely by the presence of ferruginous pebbles on the surface and to some extent in the soil and subsoil. This series is of small extent in the county, but the soils are much more productive than the Norfolk. Two types were separated, a coarse sandy loam and a sandy loam. Active erosion has in places exposed the underlying red sandy clays of the region. These have given rise to two types of the Orangeburg series, a soarse sandy loam and a sandy loam.

At the heads of some of the drainage courses in the Coastal Plain occur flat to sloping areas of light-colored soils which have been mapped as the Berzelia soils. These contain large quantities of white kaolin or kaolinized feldspar. Two types in this series, a coarse sandy loam and silt loam, occur locally.

A miscellaneous type under the name of Bradley coarse sandy loam occurs on the boundary of the Coastal Plain and Piedmont sections in several areas. It consists of a residual sandy clay subsoil, similar to that underlying the Appling soils, over which is a sandy mantle carrying some rounded waterworn gravel. Thus the material is evidently, partly at least, water deposited, representing areas where the Coastal Plain deposits overlap the Piedmont.

Along the streams of the Piedmont section narrow first bottoms have been formed of the sediments left by overflows. The soil material is variable, but for the most part consists of a brown silt loam, under which, usually at a depth of 2 feet, is a stratum of sand. The Savannah along its immediate banks has built up a natural levee, higher than the bottom proper, of sand of varying grades, ranging from coarse to very fine. The bottoms along the Savannah are not entirely overflowed, except during unusually high water; the bottoms along the smaller streams are more subject to flooding, often a number of times in a single season. The sluggish streams of the Coastal Plain section render their valley floors more or less wet, and bordering areas support a swamp vegetation. The surface material is black and mucky and underlain by compact drab sand to sandy clay. This Swamp type has no agricultural value.

A few Rock outcrop areas occur in the county. These areas are formed by two classes of rocks. The most important are Heggie Rock and the nearby rock outcrops in the central part of the county. These consist of coarse granite intrusions. A number of small areas occur in the Coastal Plain, three of them north of Berzelia. Here the rock consists of sand cemented by indurated clays. The Rock outcrop areas have no agricultural value.

The following table gives the names and extent of the several soils mapped in Columbia County:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Appling coarse sandy loam	61,440	30.7	Norfolk sandy loam	3,072	1.5
Cecil coarse sandy loam	22,784	13.2	Cecil fine sandy loam	2,432	1.2
Gravelly phase	3,584		Cecil sandy loam	2,368	1.2
Cecil clay loam	19,200	10.3	Orangeburg sandy loam	2,112	1.1
Stony phase	1,536		Swamp	1,664	.8
Norfolk coarse sand	13,120	6.5	Greenville gravelly loam	1,600	.8
Congaree silt loam	11,456	5.7	Orangeburg coarse sandy loam	1,216	.6
Norfolk coarse sandy loam	10,624	5.3	Berzelia silt loam	832	.4
Bradley coarse sandy loam	10,560	5.3	Iredell stony loam	704	.4
Cecil very fine sandy loam	4,736	2.4	Rock outcrop	448	.2
Norfolk sand	4,352	2.2	Appling coarse sand	320	.2
Appling silt loam	4,288	2.1	Tifton coarse sandy loam	320	.2
Appling fine sandy loam	4,224	2.1	Tifton sandy loam	320	.2
Berzelia coarse sandy loam	3,712	1.8	Iredell fine sandy loam	128	.1
Appling sandy loam	3,712	1.8			
Iredell coarse sandy loam	3,456	1.7	Total	200,320	

CECIL CLAY LOAM.

The Cecil clay loam is known as the " red-clay lands " of the county from the characteristic red color of the surface soil material. It varies throughout its extent, in the surface soil particularly, and has been recognized in a number of phases.

The most common phase of the type has a shallow covering of reddish sandy loam 3 or 4 inches deep, which, when plowed and mixed with the underlying clay, gives a sandy clay loam. By the close of the cropping season, through cultivation and beating rains, the clay particles have settled down or been carried away, leaving only the sandy mantle on the surface again to be incorporated with the clay the following season.

This sandy mantle varies in texture from coarse to very fine, according to the class of crystalline rocks from which it is derived. The greater part is of coarse texture. Areas of finer texture occur in the northern part of the county, along Little River. Originally the type had a sandy mantle of some depth, but this has been partly removed by erosion. Spots of the underlying clay are exposed and areas of this phase have a very spotted appearance, gray where sandy to red where clay predominates, until plowed, when the red color predominates. This has been recognized as the sandy phase of the type.

One phase of this type consists of a heavy surface soil of loam to clay loam, the loam predominating. The depth is usually from 4 to 6 inches. It is known as chocolate land, because of its dark brownish-red color. The largest area of this phase occurs on the ridge east of Cobbham, on the McDuffie County line, extending east and north over the valley of Shiloh Fork to the ridge beyond. Numerous other small areas occur in some of the other phases of the type.

The sandy phase, like the Cecil sandy loam, carries some quartz fragments and stone, but not usually in large quantities. The loam phase has only occasionally some quartz on the surface.

Both phases are underlain to a depth of several feet by the characteristic dark-red, stiff, tenaceous clay so common throughout the Piedmont Plateau province. It is free of stone, except for occasional veins of quartz. Another marked characteristic of the clay is the presence of sharp quartz and mica particles.

Cecil clay loam, stony phase.—A third phase occurs along Little River, as indicated in the map by hachures, with schist fragments in the soil mass and upon the surface where derived from a chloritic schist. It consists of 4 to 8 inches of red clay loam carrying a large quantity of chloritic schist in flakes and slabby pieces, under which is found a dark-red clay, in some places friable. The schist fragments are much decomposed and give to both soil and subsoil a soapy or

greasy feel. The rotten underlying rock beds are quite commonly encountered at from 20 to 30 inches beneath the surface, though in places the depth exceeds 36 inches. This phase occurs as a narrow belt along Little River, extending into the horseshoe bends.

The Cecil clay loam is of residual origin, formed in place from the weathering of a variety of igneous and metamorphic crystalline rocks of pre-Cambrian age. Granite and granitic gneiss probably predominate in this soil formation, with the exception of the areas along Little River derived from chlorite or talc schist. In all areas, except of the latter, weathering has gone on to considerable depths, the deepest erosion not exposing the solid rock bed.

The type has good surface drainage, but the subsoil is rather close to permit the free movement of water, and while retaining moisture well does not give it up readily to plants. Crops suffer from lack of moisture during any prolonged dry spells.

The Cecil clay loam is the heaviest soil in the county and the most difficult to till. The "chocolate land" phase is better in this respect than the other phases. The type in general is considered good land, and gives, as a rule, yields of the staple crops above the average for the county.

Large bolled varieties of cotton yield well on this soil, averaging between one-fourth and one-half bale to the acre, with three-fourths bale not uncommon, while more than 1 bale has been reported for small acreages. Corn yields 15 to 30 bushels and oats do better than on most of the soils. Cowpeas grow luxuriantly and may be used for the production of either hay or seed. Wheat, on the little patches that are grown, gives 8 to 10 bushels to the acre. The type is retentive of fertilizers and responds to good treatment.

It is difficult to prepare a good seed bed in this soil with the implements used, and therefore it is very seldom put in the very best of tilth. Like the other soils it lacks organic matter. Supplying this in some form will do more to improve the physical condition and productiveness than any other one thing that may be done. As little barnyard manure is available, the organic matter must be supplied by plowing under all roughage instead of burning it, and by growing green manuring crops, preferably legumes, such as cowpeas or the vetches. Rye for winter cover and pasture could well be employed in the same way. Liming would also be highly beneficial to this soil.

Deeper plowing should be practiced, bringing a little of the subsoil to the surface gradually. Good results follow subsoiling, and with proper harrowing to get the seed bed fine a large supply of moisture would be held available for plant growth. The after-cultivation should be shallow, with small-toothed implements, to form a surface mulch, which is important in conserving moisture. Improvement in methods of management are quickly reflected in increased yields and profits.

Farms of this type of soil might well be devoted to stock raising, or at least the raising of mules, horses, and cattle should form one of the main interests of the farm.

The heavy soil is well adapted to grasses. Johnson grass makes a heavy growth, but is regarded as a pest. Bermuda grass makes the best pasture grass for stock in this section, and would prove a profitable crop on most farms.

The rougher lands of the Cecil clay loam find their use in grazing live stock. A large part of this land lies in sections of the county remote from towns and railroads and is in large farms worked by negro tenants, and crops other than cotton do not receive attention. Some of the roughest parts of this land should be left forested, as the soil washes badly, and fields are soon so gullied as to be almost worthless. Broom sedge takes possession of the abandoned land and does much to hold erosion in check.

Well-located areas of this soil are highly prized and as a rule not on the market. The value when not near the railroad ranges from $20 to $25 an acre. Very nearly all the Cecil clay loam is cleared and under cultivation.

The following table gives the average results of mechanical analyses of the soil and subsoil of the typical Cecil clay loam:

Mechanical analyses of Cecil clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
251827, 251835.....	Soil.....	3.7	13.8	10.8	24.6	12.2	17.6	17.2
251828, 251836.....	Subsoil.....	1.9	7.2	5.1	10.3	4.4	19.3	51.8

CECIL COARSE SANDY LOAM.

The typical Cecil coarse sandy loam consists of a grayish coarse sandy loam, with an average depth of 6 to 8 inches, overlying a stiff, tenacious dark-red clay to 36 inches or more. The surface soil usually carries more or less coarse angular material, ranging from small sharp gravelly fragments to larger angular and subangular blocks of stone, and in places the type becomes quite gravelly and stony. The rock consists largely of quartz with some feldspar, granitic gneiss, and other igneous metamorphic rocks.

Cecil coarse sandy loam, gravelly phase.—An especially gravelly phase of the type is shown in the map by hachures. Areas of this phase occur in the vicinity of Heggie Rock, where the type has been derived from a very coarse grained granite or granite porphyry. They are marked by the presence of a great quantity of small rectangular rock fragments up to 1 inch in diameter. These are largely

feldspar, but considerable quartz is present. The quantity is sufficient to cover the surface and fill the soil, which is from 6 to 12 inches in depth. In color the soil is similar to that of the typical areas of the Cecil coarse sandy loam, a gray or brownish gray changing to a yellowish brown below. The subsoil is the same stiff, tenacious dark-red clay found underlying all areas of the Cecil series.

The Cecil coarse sandy loam is found in many small areas throughout the central part of the county, in the Piedmont section. As a rule the areas are irregular in shape and are associated with the Appling coarse sandy loam and the Cecil clay loam, the latter occupying eroded areas formerly of this type.

The surface configuration of the Cecil coarse sandy loam varies. On the tops of stream divides and the broader interstream areas the surface is rolling. Many of the areas occur along some of the larger streams, and here the topography is rough and broken, the ridge tops narrow, and the slopes steep, making terracing necessary.

The position this soil occupies insures good surface drainage, which on steep slopes is excessive, causing erosion, unless great care is taken to hold the soil in check. The coarse-textured soil permits the ready passage of water, so that on the slopes moisture soon seeps to lower levels. The subsoil is close and retentive of moisture, and with ordinary care the land withstands drought well. When wet this soil has the consistency of mortar, but on drying it hardens to a surface crust. Where the soil is deep a hardpan is often formed if the depth of plowing is not varied.

The Cecil coarse sandy loam is a residual soil derived from a variety of coarse-grained igneous and metamorphic crystalline rocks. Most important among these are a granite-gneiss, fragments of which may be seen on the surface of most of the areas. The gravelly phase in the vicinity of Heggie Rock appears to come entirely from a coarse intrusive granite, in which are large crystals of feldspar, giving rise to the "arkose" gravel found in this phase of the type.

If kept from crusting this is a comparatively easy soil to cultivate. It is devoted to the general farm crops, cotton and corn, of which it furnishes fair to average yields. Cotton yields from one-fourth to one-half bale to the acre, with applications of 150 to 200 pounds of commercial fertilizer, and with better cultural methods higher yields are readily secured. Corn yields 15 to 30 bushels to the acre.

This soil has a fairly wide range of adaptation and a greater variety of crops should be grown. Systematic rotations should be adopted, including some of the legumes. The acreage in oats should be extended, as they yield well. Organic matter is lacking and rotations should be planned to add this valuable constituent.

Much of the rougher parts of this land should be devoted to pasturage and grazing of stock, especially in the more remote districts.

A systematic reforestation would be advisable on the steeper slopes. The growing of locust for fence posts might prove profitable. The principal forest growth is shortleaf pine, with some oak and other hardwoods.

The value of this land varies according to its location. Prices range from $15 to $25 an acre.

CECIL SANDY LOAM.

The surface soil of the Cecil sandy loam, to an average depth of 5 to 8 inches, consists of a grayish to yellowish-brown and sometimes reddish-brown medium sandy loam containing rock fragments, principally of quartz and granite-gneiss, the quantity often sufficient to make the soil quite stony. The subsoil to a depth of over 36 inches consists of a stiff, tenacious dark-red clay, becoming heavier with depth and, at 3 to 5 feet, mottled or streaked with different shades of yellow and red.

The occurrence of the Cecil sandy loam is limited to a few areas in the north-central part of the county between the coarser textured soils to the south and the finer soils on the north. The topography of these areas is hilly, the soil extending from the summits of the hills or ridges down the slopes to the streams. The slopes are often steep and the run-off rapid, and considerable damage has been caused by erosion. Like the other sandy types of the Cecil series, it withstands drought very well, and is a fairly easy soil to cultivate.

The Cecil sandy loam is derived through the weathering in place of the underlying rock beds, consisting of a variety of igneous and metamorphic rocks. A granite-gneiss probably gives the larger part of the material of this type.

Yields of the general farm crops, cotton and corn, are a little above the average for the county. Cotton varies from one-fourth to one-half bale and corn from 15 to 30 bushels per acre. The soil responds quickly to good treatment. Like all the other members of the series, it is lacking in organic matter, which should be supplied by occasionally turning under some green manuring crop, preferably a legume. In some parts of Georgia this soil is used successfully for peaches, but the remoteness of the areas in this county from transportation facilities precludes its present use for commercial peach growing here. The type is adapted to a variety of crops, and the arrangement of satisfactory rotations should offer no difficulties.

CECIL FINE SANDY LOAM.

The surface soil of the Cecil fine sandy loam consists of a grayish to yellowish-brown, and in places reddish-brown, fine sandy loam, ranging in depth from 4 to 10 inches, with an average depth of not

over 6 inches. The surface mantle is generally shallow and, as with the other sandy types of this soil series, eroded spots occur in which the underlying red clays are exposed at the surface. The subsoil, which extends to a depth of several feet, consists of the typical dark-red clay of the Piedmont section. It varies somewhat in texture and often carries enough fine sand, especially in the upper part, to make it a friable sandy clay. Upon the surface and in the soil occur quartz fragments. As a rule the subsoil is free of rock, except occasional quartz veins.

A number of comparatively small areas of this soil are found in the northern part of the county, where it is associated with the other fine-textured types. It occupies gently sloping to low, hilly areas and there are few steep slopes. It has good surface drainage. With its close structured subsoil and sandy surface soil it is retentive of moisture and withstands drought well. It suffers some through surface erosion unless care is taken to prevent it.

The type is of residual origin, being derived from a variety of finely crystalline igneous and metamorphic rocks. Weathering has been quite complete, quartz being practically the only rock found in the soil mass or upon the surface.

This is an easy soil to cultivate and a productive one. It responds readily to good treatment and is retentive of moisture. The general crops, cotton and corn, are grown upon it. Shortleaf pine, with some oaks and other hardwood trees, are the predominant forest growth. Farms of this type of soil range in price from $15 to $30 an acre.

CECIL VERY FINE SANDY LOAM.

The Cecil very fine sandy loam consists of a very fine sandy loam, 5 to 6 inches deep, and grayish to yellowish brown or reddish brown in color, overlying the typical dark-red clay of the Piedmont section. Numerous red spots caused by exposure of the underlying clay occur throughout the areas of the type, giving it a spotted appearance. The soil carries some small particles or fragments of quartz and in places quartz fragments several inches in diameter occur, but the quantity of stone is rarely conspicuous.

The subsoil extends to unknown depths. The texture varies somewhat. In places it contains enough fine sand to render it friable; in others it is very stiff, tenacious, and plastic. The subsoil is as a rule free from stone, but occasionally some vein quartz is encountered and quite commonly sharp quartz grains are scattered through it. Small particles of chloritic or talcose schist sometimes give the material a greasy feel.

The Cecil very fine sandy loam is confined to the northern part of the county, in the section along Little River. It extends as an irregular belt broken by areas of other soil types, and occupies part

of the wide eroded shelf having somewhat the appearance of a terrace. The topography is moderately hilly, the broader interstream areas being gently rolling, with slopes to streams only in part steep. The greater part of this soil lies well for cultivation. The surface drainage is good, and the run-off in some cases too rapid, causing considerable erosion. The fine-textured soil makes an excellent surface mulch and the type withstands drought well and is retentive of fertilizers.

This soil is of residual origin, derived from the weathering of fine-grained igneous and metamorphic rocks, largely, if not entirely, schists and gneisses.

The Cecil very fine sandy loam is one of the best soil types of the county, giving good yields of the general farm crops—cotton and corn. It responds readily to fertilizers and good treatment in general and the effect of any improvement lasts for some time. Care, however, should be taken to prevent washing, and where the slopes are steepest terracing should be employed. Crop rotations, including a leguminous crop, to be turned under for green manuring, should be adopted. This soil has naturally a wide crop adaptation and no trouble should be experienced in deciding upon suitable rotations. Remoteness from railroad facilities is the chief limitation in its use for a number of special crops.

The principal tree growth on virgin areas is shortleaf pine, with a scattering of hardwoods. Land values range from $20 to $25 an acre.

The mechanical analyses of typical samples of the soil and subsoil gave the following results:

Mechanical analyses of Cecil very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
251843	Soil	0.7	1.8	1.9	11.3	34.1	41.9	7.4
251844	Subsoil	.2	.4	.4	3.3	10.4	45.1	40.6

IREDELL STONY LOAM.

The Iredell stony loam is confined to Birch Mountain, in the northeastern part of the county. This tract consists of a narrow mountainous ridge rising 200 feet or more above the surrounding country. The crest is sharp, with outcropping rock ledges, has been mapped in part as Rough stony land, and is worthless for agriculture. The slopes are covered by talus and are so stony that cultivation is difficult. The soil material is variable in texture and color. The typical soil, to a depth of 16 inches, consists of a grayish-brown to greenish-

brown loam, grading into a yellowish heavy plastic clay. This may continue to a depth of 3 feet or may pass at 20 inches into a dingy yellow or greenish-yellow clay having a greasy feel and containing some partially decomposed rock. There are some spots, particularly on the western extremity of the mountain, where the soil is a brown to slightly reddish-brown fine loam with a depth of 6 inches, underlain by dark-red clay. In places greenish-yellow or brownish decomposed rock comes within 8 or 10 inches of the surface.

A considerable variety of rocks enter into the formation of this soil. They are metamorphosed igneous rocks, diorite, possibly chlorite, hornblende schists, and a rock high in quartz.

None of the Iredell stony loam is under cultivation. It supports a forest growth of longleaf and shortleaf pine and some scrubby oaks.

IREDELL COARSE SANDY LOAM.

The surface soil of the Iredell coarse sandy loam consists of 18 inches of a dull-gray to greenish-brown coarse sandy loam, containing rounded iron concretions and fragments of quartz and other rocks. The quantity of coarse material is sufficient in places to make the type a stony sandy loam. The subsoil is a plastic waxy clay, typically a dingy greenish-yellow color, containing some rotten rock material, and usually at a depth of less than 36 inches resting upon the partially decayed rock beds. In some places a variation from the typical color occurs, the material being mottled red and drab similar to the subsoil of the Appling coarse sandy loam, with which type the Iredell areas are closely associated.

The Iredell coarse sandy loam occurs in the Piedmont section of the county and is of small extent. There are three principal areas, one surrounding Birch Mountain, another between Delph and Old Kiokee Baptist Church, and the third about midway between Grovetown and Appling. A number of small areas, a few acres in extent, were also mapped in different parts of the county, and there are numerous spots too small to map on the scale used in the present survey. The smaller areas occur generally on the slopes at the heads of ravines; the larger areas cover the slopes and extend over the summits of the hills or ridges. In part the slopes are steep and badly eroded, the surface covering being largely washed away, leaving the underlying clay exposed or very near the surface.

The Iredell coarse sandy loam owes its origin to weathering of a variety of igneous metamorphic crystalline rocks, in which diorite, hornblende, and chlorite schist are prominent. The soil formation is generally shallow, erosion probably preventing any great depth of soil material.

The position of the areas promotes rapid removal of the surface water, but the clay subsoil is so impervious that there is very little

movement of water through it. The areas are noticeable because they have a moist or wet appearance even on steep slopes. In wet years they hold so much water that crops suffer. A moderately dry year is more favorable to crop production on this land, and at best it is considered poor land and difficult to handle. It is probably best suited for pasture. Bermuda grass could be grown on it to advantage.

IREDELL FINE SANDY LOAM.

The surface soil of the Iredell fine sandy loam, to a depth of 6 to 8 inches, consists of a greenish or yellowish-brown heavy fine sandy loam. Scattered over the surface and in the soil are small iron concretions about the size of a pea, with some quartz. The subsoil consists of a waxy greenish-yellow clay usually running into partially decomposed rock at 24 to 30 inches.

The type is mapped only in two small areas in the northern part of the county, where it is associated with the Cecil very fine sandy loam. Small spots too small to map were frequently encountered in low spots upon the stream divides.

The Iredell fine sandy loam is residual in origin, being derived mainly from diorite. It is a poor soil and where shallow is difficult to work, the clay subsoil being waxy and intractable.

Below are given the results of mechanical analyses of samples of the soil and subsoil of the Iredell fine sandy loam:

Mechanical analyses of Iredell fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
251807	Soil	4.3	5.0	2.8	17.8	25.2	33.3	11.3
251808	Subsoil	.7	.5	.5	4.6	8.8	29.0	55.7

APPLING COARSE SANDY LOAM.

The surface soil of the Appling coarse sandy loam in its typical development consists of a loamy coarse sand to light coarse sandy loam carrying varying quantities of coarse rock fragments, mostly quartz. Small areas on some of the slopes are quite stony. The light gray color of the surface soil is in striking contrast with the associated brown and red soils. A few inches beneath the surface the color changes to pale yellow, becoming lighter with increased depth.

The depth of the soil varies considerably within a short distance; rarely is it less than 8 inches and frequently as much as 24 to 30 inches, the average being 12 to 15 inches. Along the Savannah River the soil is generally deeper than in the central and western

parts of the county. Where the soil is 10 inches or less in depth it rests directly upon the clay subsoil, but where the sandy mantle is deeper there is a transitional zone of 3 to 6 inches of yellow or mottled yellow and red heavy sandy loam to sandy clay loam.

The subsoil in its first few inches is somewhat sandy, grading into a heavy sandy clay which becomes stiff and more plastic with depth. A marked characteristic of the subsoil is its mottled or striped red and yellow color. In places the yellow mottling predominates, while in others the red mottling is most conspicuous. Again the red and yellow colors are of equal prominence, with an occasional slight drab or grayish mottling. In places the lower subsoil has somewhat the characteristic of the Iredell subsoil material. As mapped some small spots of Cecil clay or clay loam had to be included. These are sometimes scattered over areas of the Appling coarse sandy loam in a way suggesting that the entire area belongs in the Cecil series.

The Appling coarse sandy loam is the most extensive soil type in the county, occurring in large, unbroken bodies in the Piedmont section, where it is closely associated with the coarser crystalline rocks. In the eastern part of the county along the Savannah River its largest unbroken bodies are encountered, while in the central and western parts of the county the areas are broken by the occurrence of other soil types.

Areas of this type occupy all topographic positions in the Piedmont Plateau. On the tops of the broad interstream areas or ridges the surface is gently rolling and favorable for cultivation, but as the larger streams are approached it becomes more broken and hilly, with steep slopes, the type here forming some of the roughest topography in the county. The topography averages probably a little less rolling than that of the Cecil series.

In general the type has good surface drainage, and on the steeper slopes the run-off is rapid and considerable erosion takes place. The porosity of the soil, its close clay subsoil, and its good depth render it capable of holding considerable water. On the slopes, however, the coarseness of the soil allows rather rapid seepage down the slope.

The Appling coarse sandy loam is formed in place by the weathering of a variety of coarsely crystalline igneous-metamorphic rocks, of which a grayish schist, granite schist, and hornblende schist are most important. The weathering has been quite complete, quartz being practically the only rock left in the soil. Occasionally bowlders of the parent rocks are seen. Except on eroded slopes, where the underlying more or less weathered rock beds may be encountered within 36 inches of the surface, the depth of the soil formation varies from several feet to unknown depths.

The light sandy soil of this type makes it easy of cultivation, even with the one-horse implements used by the tenant farmers. It is

used for corn and cotton chiefly. Cotton yields one-fourth to one-half bale and corn 10 to 30 bushels per acre. Commercial fertilizer is used on both crops. It is the usual cottonseed meal, acid phosphate, and potash mixture, analyzing from 8–2–2 to 10–2–3, and applied at the rate of 150 to 300 pounds to the acre. Some oats are grown. About 15 bushels to the acre is a good yield, though as high as 50 bushels have been obtained. A few small peach orchards are in bearing upon this type and the quality of fruit is said to be excellent. These orchards are on hills along the Savannah. The growers are at a disadvantage in marketing the crop, the orchards are not well cared for, and consequently do not do as well as they should. This soil is undoubtedly well adapted to this fruit.

The greatest need of this soil is organic matter. Aside from applications of barnyard manure and other roughage of the farm the use of green manuring crops is a necessity. This soil has a wide adaptation not only for the general farm crops, but for special crops, such as heavy truck and fruit. Besides the crops mentioned both sweet and Irish potatoes could be grown advantageously upon it. A number of satisfactory rotations could be planned and the general productiveness of the type much improved. Plowing should be to a depth of 10 to 14 inches, organic matter liberally supplied, and the soil used mainly for cotton, corn, oats, rye, cowpeas, bur clover, soy beans, sweet and Irish potatoes, melons, and vegetables.

The farms on the type are rather larger than the average. The land is mostly all cleared and under cultivation. Land values range from $10 to $25 an acre, farms with better improvements sometimes bringing more than the latter figure.

Mechanical analyses of samples of soil and subsoil of this type gave the following results:

Mechanical analyses of Appling coarse sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
251839	Soil	5.4	23.7	16.8	26.9	10.6	12.0	13.9
251840	Subsoil	3.0	14.9	9.2	15.0	6.5	11.2	40.4

APPLING COARSE SAND.

The Appling coarse sand consists of about 6 inches of light-gray moderately coarse sand to loamy coarse sand, underlain by similar material of yellowish-gray color. In its largest area, east of the village of Winfield, the underlying rock bed is encountered at 18 to 24 inches. In the other areas, which are small, the soil extends over 36 inches and becomes heavier in texture with depth.

The total extent of the type is less than 1 square mile. It is confined to three areas, two of them of only a few acres, occupying the tops of ridges in areas of the Appling coarse sandy loam.

The depth of coarse sandy material makes this soil leachy and of rather low productiveness, but its slight extent renders it of little importance.

APPLING SANDY LOAM.

The Appling sandy loam, to a depth of 8 to 10 inches, consists of a gray medium sandy loam changing to yellowish gray beneath the surface. The subsoil is generally a yellowish-red to reddish-yellow heavy sandy loam to sandy clay, usually mottled or streaked with shades of red and yellow, the mottling increasing with depth. The lower subsoil is heavier and somewhat plastic. The subsoil is usually more than 36 inches deep. Some rock fragments, mainly quartz, are usually found on the surface and in the soil.

The Appling sandy loam is found in a continuous belt varying from one-fourth to 1 mile wide, extending along Kegg Creek from near its mouth to above its source near Winfield. Two small detached areas lie south of this belt near Phinizy. The topography of the western part of the belt is gently sloping to moderately hilly. Farther down Kegg Creek it becomes more broken. The drainage is good.

The Appling sandy loam, like the other members of this series, is derived from igneous-metamorphic rocks of pre-Cambrian age.

Under natural conditions the Appling sandy loam is distinguished by a forest growth of shortleaf pine. In cultivation it is suited to grow oats, rye, cotton, corn, peanuts, sweet and Irish potatoes, and forage crops. It is an easy soil to cultivate and fairly productive. Average yields of cotton and corn are secured upon it with the use of fertilizers. A few farms on this type, where better cultural methods are employed and heavier applications of fertilizers made secure much better yields than the ordinary, the soil responding readily to good treatment. Like all the soils of the section it lacks humus and its greatest need is the incorporation of organic matter. This, aside from the use of barnyard compost and other roughage is best secured by plowing under cowpeas, vetch, or bur clover.

The type is remote from railroad facilities. Its value ranges from $10 to $25 an acre.

APPLING FINE SANDY LOAM.

The Appling fine sandy loam consists of a light-gray fine sandy loam, changing to yellowish gray beneath the surface. In depth it ranges from 8 to 20 inches. The lower portion generally becomes more clayey, in the last 3 to 6 inches grading into a heavy subsoil of clay of variable texture and peculiarly mottled or streaked as de-

scribed in connection with the other Appling soils. In a number of areas the subsoil contains enough fine sand to make it porous and friable throughout the 3-foot section, although it often becomes heavier with depth. In some cases the sandy loam or sandy clay of yellow color mottled with red persists to depths of 36 inches. Under a part of the type the subsoil is a stiff and more or less plastic clay, usually with some partially decomposed rock material scattered through it which imparts a greasy or soapy feel. Scattered over the surface and in the soil are found areas of quartz and other rock varying in size from small pieces to fragments several inches in diameter. Except in small areas they are not a prominent feature.

The Appling fine sandy loam is found in the northern part of the county in the general belt of fine-textured sandy soils. It is of comparatively small extent, the areas occurring as narrow strips. It is found on the gentle slopes of the high ridge south of Little River and on some low hills of the shelf along the river. It has good surface drainage, and though its topography is not rough it is easily eroded where care is not taken in cultivation. It holds moisture well and is retentive of fertilizers.

This type is a residual soil derived from the weathering of finely crystalline igneous and metamorphic rocks, owing its formation, as indicated by exposures in roadcuts, to granite-gneiss and talcose and chlorite schists.

Because of its light sandy nature the Appling fine sandy loam is easy to cultivate. It gives fair yields of cotton and corn. The legumes, sorghum, peanuts, oats, rye, and sweet and Irish potatoes would do well. The type yields readily to improvement. Its greatest need is organic matter, which can best be supplied by plowing under green manuring crops, particularly the legumes. Liberal applications of commercial fertilizers relatively high in nitrogen and potash give good results.

Most of the land of this type is cleared and under cultivation. The forest growth is principally shortleaf pine. Land values range from $20 to $25 an acre.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Appling fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
251805	Soil	1.1	4.3	4.7	27.5	26.8	29.7	25.4
251806	Subsoil	1.1	4.5	3.3	11.0	9.4	22.2	48.3

APPLING SILT LOAM.

The surface soil of the Appling silt loam ranges in depth from 8 to 18 inches, with an average depth of 10 to 12 inches. It consists of a silt loam carrying an appreciable amount of very fine sand, predominately gray on the surface, but changing in a few inches to yellowish gray or reddish yellow. The soil is light and rather fluffy and the presence of minute particles and larger flakes of chlorite schist imparts to it a more or less greasy or soapy feel. Quartz fragments are also scattered over the surface. Usually the lower portion of the soil, especially where deep, is considerably heavier and more clayey, a transitional stage between the soil and the clay subsoil. The subsoil consists of silty clay, often quite sandy and friable, and again heavy and plastic. There are generally some decomposed schist fragments scattered throughout the subsoil, which give it the same peculiar soapy feel characterizing the soil. Partially decomposed rock is frequently found from 20 to 30 inches beneath the surface. Some of the areas contain an excessive proportion of schist particles and flakes in both the soil and subsoil and are rendered conspicuous by their silvery appearance. In some parts of the area, especially in the area along Little River from the vicinity of Lockharts Ferry to its mouth, schist fragments make up a large part of the formation. Such areas are called locally "slaty land."

The color of the subsoil is variable, but is usually a yellowish red. The subsoil is distinguished from the Cecil subsoil by mottling or streaks of lighter or darker shades of red. Frequently it is yellow and sometimes of a drab or greenish blue. This greenish material is closely related to the Iredell subsoil.

The Appling silt loam is confined to the northern part of the county, occurring in two belts, one along Little River, intercepted by areas of other soil types, and the other on the high ridge south of the river. The total extent is not large. The areas along the river are broken and hilly, while the surface of the high ridge is more rounded and has a generally smooth surface.

The surface configuration promotes rapid drainage, a feature which has resulted in heavy damage to the type from erosion. The schist rock flakes in the soil and subsoil also assist the internal movement of water, yet the type is claimed to be fairly retentive of moisture and not subject to drought. This soil is in general an early soil, as compared with surrounding types.

It is residual in origin and derived from the weathering of fine-grained metamorphic rocks, probably largely chlorite schists. Being easily eroded, a great depth of soil has not been formed and the rotten rock is usually encountered within the 3-foot profile.

The Appling silt loam is a fairly productive soil. With ordinary applications of commercial fertilizers good crops of corn and cotton are secured. It should be handled carefully on account of its tendency to erode. This usual deficiency in organic matter is apparent, and the methods already outlined to incorporate this constituent in soils should be employed.

Under natural conditions the type supports a mixed growth of shortleaf and longleaf pine, with a scattering of different species of hardwoods.

The results of mechanical analyses of samples of the soil and subsoil of the Appling silt loam are given in the following table:

Mechanical analyses of Appling silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
251803	Soil	2.4	4.2	2.4	9.1	14.9	58.8	7.8
251804	Subsoil	1.7	2.2	1.4	4.8	10.1	49.0	30.7

BRADLEY COARSE SANDY LOAM.

The soil of the Bradley coarse sandy loam consists of a light coarse sandy loam, grayish on the immediate surface and yellowish beneath. It ranges in depth from 8 to 20 inches, with an average of 10 inches. As the depth increases the soil changes to a stratum of heavy sticky sandy loam to sandy clay loam, yellow in color, and from 3 to 6 inches thick. The underlying material is clay, varying in color and somewhat in texture and structure. Often the upper part is somewhat sandy, but usually this soon changes into a clay, the texture becoming heavier and the structure more plastic with increase in depth. Quite commonly the clay carries mica in conspicuous quantities and has a greasy feel. Some small particles and fragments of quartz and other rocks are found throughout the soil mass.

The subsoil is streaked or mottled like that of the Appling sandy loam, which it closely resembles. The mottling usually increases with depth.

In the soil and upon the surface are found varying amounts of gravel and stone, both angular and rounded, the former largely quartz. Both the quartz and rounded gravel are waterworn, this being the characteristic distinguishing the type from the Appling coarse sandy loam. Except in small spots the proportion of gravel is not excessive.

The Bradley coarse sandy loam covers a considerable area in that section of the county forming the border of the Piedmont and Coastal Plain. The largest area extends between Uchee and Little Kiokee

Creeks. Northwest of Harlem and north of Grovetown a few other areas occur.

The topography of the Bradley coarse sandy loam is moderately hilly to gently rolling. Its areas extending into the Coastal Plain follow the lower slopes of the stream courses. The type becomes hilly in the more northern extensions. where it merges into the Appling coarse sandy loam and Cecil coarse sandy loam.

As a whole the surface permits cultivation of practically all of this type, the slopes for the most part being gentle, though sufficient to afford good surface drainage. Depressions, however, are frequently improved by the use of open ditches.

The Bradley coarse sandy loam consists of sedimentary material in the surface portion and a residual material in the subsoil. The presence of rounded gravel in the surface indicates that all or part of this material is of transported origin, while the subsoil is undoubtedly residual, having been derived from rocks similar to those forming the Appling coarse sandy loam, i. e., igneous and metamorphic gneisses and schists of pre-Cambrian age. The Coastal Plain deposits evidently extended uniformly over the areas occupied by this type and probably were originally considerably deeper than now, but how much of the present material, except the rounded gravel, is transported can not be stated.

This type does not differ materially in crop adaptation and productiveness from the Appling coarse sandy loam. The tree growth is mainly shortleaf pine, with some longleaf pine and a scattering of the different species of deciduous trees found in the section. The same general crops and yields are obtained as from the Piedmont soils. The type is largely cleared and under cultivation. It needs the same treatment as the Appling coarse sandy loam as to incorporation of organic matter in the soil. Deeper plowing and subsoiling should be practiced. The value of farms composed of this soil ranges from $10 to $25 an acre.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Bradley coarse sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
251855	Soil	11.2	21.1	14.7	24.2	7.6	15.9	5.7
251856	Subsoil	3.0	11.0	7.2	12.5	6.0	20.1	39.9

NORFOLK COARSE SAND.

The Norfolk coarse sand has a depth of 36 inches or more. The surface 6 inches consists of a gray coarse sand, with frequent gravelly

areas capping the higher positions of the type. Flat areas occur in the vicinity of Martinez, some of them having a hardpan from 1 to 6 inches thick at a depth of 4 to 5 inches below the surface. Rounded gravel and ferruginous pebbles occur scattered throughout the soil profile, areas where these are most abundant being indicated on the map by appropriate symbols.

The surface soil is dark drab, grading into yellowish gray and pale yellow with depth. On some of the hilly locations, where the subsoil has been exposed by erosion, it shows a reddish tinge similar to that noted in the Orangeburg soils.

The subsoil extends to depths exceeding 36 inches, but generally the underlying clay is 4 to 5 feet beneath the surface, the latter depth being rarely exceeded. On some of the hill slopes the subsoil in the lower depths has a reddish color similar to that of the subsoil of the Orangeburg series of soils.

The hardpan mentioned above consists of the compacted soil material, with possibly some slight cementation. It has been caused almost entirely by plowing to the same depth year after year. It is very hard and difficult to break up, but when brought to the surface and exposed to the weather soon crumbles.

The Norfolk coarse sand is the most extensive soil type in the Coastal Plain section, where it occurs in comparatively large areas. It occupies the ridge tops and slopes. The general surface is uneven and hilly.

The type is derived from coarse marine-deposited sediments laid down as beach deposits or near the shore of the sea.

The coarse texture and general loose structure of the Norfolk coarse sand makes it droughty and leachy. For this reason it is a hard soil to improve. It gives low yields, especially of cotton. Corn when fertilized yields 10 to 15 bushels to the acre. Watermelons do well and a considerable acreage is planted to this crop. Applications of 300 to 500 pounds of a 9–2–3 or 10–2–4 fertilizer are made, supplemented by barnyard compost. A large commercial orchard of peaches is in bearing on this type. The location is favorable, especially for air drainage, being on a side slope. The trees are given constant cultivation to conserve soil moisture and commercial fertilizers are used.

Fertilizers for this soil should be relatively high in nitrogen and potash, and the application should be heavy for best results. Mixtures of cottonseed meal and kainit have been found very satisfactory. Cowpeas or other legumes should be grown and occasionally plowed under to supply the much needed organic matter and nitrogen.

Comparatively little of the Norfolk coarse sand is cleared and under cultivation. It supports a growth of longleaf and shortleaf

pine and some blackjack and scrub oak growth. Broom sedge grows in the more open places. The type could well be used in the production of early truck crops. This industry has been developed in a small way in the vicinity of Martinez, which is only 6 miles from Augusta. Around Martinez this land is selling for $25 to $40 an acre; elsewhere its value is low.

NORFOLK COARSE SANDY LOAM.

The surface sandy mantle of the Norfolk coarse sandy loam ranges from 10 to 30 inches in depth, the average distance to the underlying clay being about 20 inches. In texture it varies from a rather loose incoherent coarse sand to a loamy coarse sand, or in shallower depths of the soil to a light sandy loam. Where the depth of the soil is close to 3 feet the texture and structure approach that of the Norfolk coarse sand, the main difference being the presence of clay within the 3-foot section. The color is gray on the surface, changing to yellowish gray, or in places a light yellow beneath.

The subsoil consists of a yellow, friable, coarse sandy clay, the upper portion being quite sandy, often a sticky sandy loam, but becoming heavier and more plastic with depth. In the deeper areas of the soil the sandy loam sometimes reaches to depths greater than 36 inches. Usually at 6 feet either a brick-red clay or a purplish red and drab mottled sandy clay is encountered. Quite commonly at depths of 30 inches mottling is found in the sandy clay. This is due to decomposed ferruginous material.

The type as a whole carries more or less rounded gravel, mostly quartz, and in a few locations the quantity is sufficient to warrant separation of the areas. The largest of these lie northeast of Grovetown, on Crawford Creek, where rounded gravel makes up a large part of the soil mass to depths of 30 inches. The soil here rests on a yellow sandy clay. There also occur on these areas, associated with the Bradley coarse sandy loam and Berzelia coarse sandy loam, some angular quartz gravel and stone, but in no great quantity.

The Norfolk coarse sandy loam is, next to the Norfolk coarse sand, the most extensive soil type of the Coastal Plain section. It is found on the ridge tops to some extent, but its most typical occurrence is on slopes where erosion has carried off some of the lighter material, and left the clay within 36 inches of the surface. It is a sedimentary soil of marine origin deposited near shore and in moving water, as evidenced by the coarseness of its materials and the rounded gravels.

The presence of clay within the 3-foot section makes this a stronger soil than the Norfolk coarse sand. Fair yields of the general farm crops are secured, though where the soil is very deep it is leachy and difficult to improve, particularly where very gravelly. Some areas yield one-half bale of cotton to the acre, but this is much above the

average for the type, which is usually one-fourth bale. Corn yields 10 to 25 bushels to the acre with fertilization. The type is really best adapted to truck crops, as it is dry and warms up early. Its first need is the incorporation of organic matter. Where the location is favorable peaches would no doubt succeed. Sugar cane grows well and makes a good quality of sirup. Liberal applications of fertilizers high in potash and nitrogen are necessary for good yields.

A large proportion of the Norfolk coarse sandy loam still remains in forest, and as a whole the soil is not in much demand and has a low value. The tree growth, which attains good size, is mainly longleaf and shortleaf pine, with some hardwoods.

NORFOLK SAND.

The Norfolk sand consists of a uniform medium sand to a depth of 36 inches or more. It grades from yellowish gray in the surface 6 inches to pale yellow in the lower part of the section, there being no distinct demarcation between the soil and subsoil. The surface is for the most part loose and incoherent, though in places it compacts slightly. Underlying the sand at an average depth of 4 to 5 feet is a yellow sandy clay, changing abruptly within the first foot or more to a peculiar mottled red and drab, tinged with purple. As a whole, the areas of this soil are free of rounded gravels, although a few ferruginous pebbles occur here and there on the surface.

The Norfolk sand occurs in a number of areas in the Coastal Plain section along the southern boundary of the county, the largest lying south of Harlem and Berzelia. It is confined to the main stream divide and the broad interstream areas. South of Harlem and Berzelia the ridge tops are flat to gently undulating and the type extends from these down the rather steep slopes to the stream courses. In the vicinity of Grovetown and east of that place the type takes on a sandhill topography, sandy hills rising above the general level of the ridges. The type has good surface drainage, and the depth of the sand and its open structure allow the ready percolation of surface waters. This makes the moisture content low and crops suffer in times of drought.

The Norfolk sand is of sedimentary origin and represents the finer portion of the deposits. It is underlain at no great depth by older deposits of clay.

Little more than one-half of the type is cleared and under cultivation, and much of this area has been reclaimed from a wild condition recently. It is not considered a desirable soil for the staple farm crops of the section on account of its tendency to drought. Fertilizers in some form must be applied to make production profitable. Different fertilizer mixtures are used, cottonseed meal being an important constituent. On the better farms a 10–2–3 mixture is

used with good results. Applications of barnyard manure or compost are also made. Farmers on the light sandy soils of the Coastal Plain rarely sell their cotton seed, considering it more profitable to apply it to the land. It would be well to increase the proportion of potash in fertilizers used on this soil and to supply most of the nitrogen by growing and turning under leguminous crops or other organic matter. Not the least benefit from this practice would be the increased moisture capacity of the soil.

On some of the better areas where the clay is not over 4 feet below the surface, some growers secure fair crops of cotton and corn, the yields averaging as much as one-half bale of cotton and 25 bushels of corn per acre. Sugar cane does well in moist locations, producing a sirup of extra quality. Usually the sugar-cane patch is only large enough to supply the needs of the family. Sweet potatoes of excellent quality are produced and the crop could be profitably grown on a larger scale. Watermelons are grown with profit for shipment to northern markets.

The Norfolk sand is primarily an early trucking soil and is used largely for that purpose in the better-known trucking sections of the Atlantic Coastal Plain. It is adapted to a variety of vegetable crops.

The value of the Norfolk sand is generally low and until a few years ago it could hardly be sold for any price. Values are now increasing.

NORFOLK SANDY LOAM.

The surface soil of the Norfolk sandy loam ranges from a medium sand to loamy sand averaging 20 inches in depth, grading in the shallow areas where not more than 12 inches deep to a medium sandy loam fairly coherent in structure. For the first few inches the soil is gray shading into pale yellow with depth. The subsoil is a sandy loam changing with depth to mealy friable sandy clay, usually yellow in the upper portions and slightly mottled with red in the lower portions, as the result of decomposing ferruginous pebbles found scattered throughout the mass.

The Norfolk sandy loam within the county is confined to a few areas in the Coastal Plain section. It is found as flat or nearly level areas on the summits of interstream sections and dividing ridges. Its surface being flat, there is little run-off from the surface, but the depth of soil and the sandy clay subsoil permit the ready percolation of the rainfall, keeping the soil in a good condition as to drainage. This type ranks among the most productive soils of the county. The presence of the clay subsoil within the 3-foot section has much to do with its productiveness. When the depth to the subsoil is 24 inches or more the texture becomes more like the Norfolk

sand, less loamy and coherent, and accompanied with the diminished productiveness noted in the latter type.

The surface is flat to gently rolling, with no waste land, making it a desirable soil to cultivate. A light sandy type, it is easily put in a good condition of tilth. Cotton gives above the average yields of the county—fully one-half bale on most of it, with a maximum of a bale or more. Corn does exceptionally well, making from 25 to 50 bushels per acre. In other sections of the State on similar soil much higher yields are common. Sweet potatoes and sugar cane also yield large crops. Good crops of Irish potatoes are secured, but only patches are grown. Watermelons average about one-half carload to the acre. Peaches bear well. Judging from the one vineyard seen on this type, grapes could be made a commercial success.

With all the crops commercial fertilizer is used. Cottonseed meal, acid phosphate, and kainit form a mixture in common use. Raw cotton seed and barnyard compost are also applied to the land. No particular formula is in general use, although there is a tendency to use better grades of commercial mixtures.

Like the other soils of the county, the Norfolk sandy loam is lacking in humus and in cultivating it rotations should be used which include one or more crops for green manuring. Growing peanuts and velvet beans between the rows of corn will be found a good practice.

The Norfolk sandy loam is one of the soils used in the development of the trucking industry of the Atlantic seaboard. It has a rather wider crop adaptation than the lighter sandy soils of this section, being a fairly good general farming soil, besides giving good results with certain truck crops. Strawberries in particular will do well on the type. In Columbia County it lies close to the railroad, and thus has the advantage of shipping facilities. This position and its natural productiveness have resulted in high prices; near the towns the land brings from $50 to $100 an acre. None of this land is on the market, and practically every acre is cleared and under cultivation. It was formerly heavily forested with longleaf and shortleaf pine.

TIFTON SANDY LOAM.

The surface soil of the Tifton sandy loam, to an average depth of 8 to 10 inches, consists of a brownish-gray or light-brown medium sandy loam, carrying a considerable quantity of ferruginous pebbles. The subsoil consists of a friable yellow sandy clay, which becomes heavier and sticky with depth, and is often mottled with red in the lower portions. Within the type are many small areas where the surface soil and subsoil have a reddish color, approaching that of the Orangeburg types. Like the Tifton coarse sandy loam the type is

of small extent, occurring in only a few small areas. It is found on ridge tops and at heads of streams on the main-stream divides of the Coastal Plain. The areas are flat to sloping and well drained.

The Tifton sandy loam is derived from Coastal Plain sediments of medium fineness, similar in all save texture to the Tifton coarse sandy loam. It is considered a very strong soil and highly prized, but its extent is not sufficient to make it of much importance. These areas produce much better than the surrounding soils. Cotton, corn, oats, peanuts, and forage crops give splendid results under good treatment.

TIFTON COARSE SANDY LOAM.

The surface soil of the Tifton coarse sandy loam, to a depth of 8 inches, consists of a brownish-gray to light-brown coarse sandy loam containing some rounded gravel and a considerable quantity of ferruginous pebbles from one-eight to one-half inch in diameter. The subsoil is a yellow sandy clay becoming heavier and sticky with depth. Usually at 24 inches it is mottled with red, as the result of the remains of decomposed ferruginous pebbles. It has a tendency to harden and bake after rains, but yields readily to cultivation.

The Tifton coarse sandy loam is of small extent, occurring only as scattered areas in the Coastal Plain section of the county. These are usually flat to gently sloping areas on the highest points of the divides and at the head of draws. They are associated with the Orangeburg soils, to which the Tifton soils are closely related.

In extent this soil type is unimportant, but the spots of it found here and there on the farms are generally the best of the lands, being very productive as compared with the surrounding soils. Wherever found it has been cleared and put under cultivation. Cotton, corn, oats, peanuts, forage crops and pecans do well. The original timber growth consisted mostly of longleaf pine.

ORANGEBURG COARSE SANDY LOAM.

The surface soil of the Orangeburg coarse sandy loam consists of a gray to grayish-brown loamy sand to light sandy loam from 8 to 24 inches in depth. Included in the type are areas which, if large enough, would have been separated as the coarse-sand member of the series. The different phases are intimately associated, and plowed fields present a spotted appearance, showing different shades of gray and red. The surface soil carries some rounded gravel and generally some ferruginous pebbles.

The subsoil is a friable sandy clay, extending to 36 inches and becoming heavier and more plastic and sticky with depth. The red color also generally becomes more pronounced in the lower part of the profile.

The Orangeburg coarse sandy loam is confined to small scattered areas in the Coastal Plain section, where it occurs on eroded slopes at heads of drainage ways.

It is a fairly productive soil, giving average yields of cotton and corn, but its extent is so small as to make it of little importance. Peaches, peanuts, pecans, oats, and forage crops do well.

ORANGEBURG SANDY LOAM.

The Orangeburg sandy loam consists of a light medium sand to light sandy loam of somewhat coarse texture, in places carrying rounded gravel and some ferruginous pebbles, the latter occasionally plentiful enough to be a prominent characteristic of both the surface soil and subsoil. The color ranges from gray through brownish gray to red, giving the fields in some places a spotted appearance. The surface soil ranges from 8 to 20 inches in depth, the average being about 10 inches.

The subsoil is a friable sandy clay usually light red in the upper portion, changing to dark red in the lower part of the profile. In places it is a dark brick red throughout. The upper portion contains considerable sand, but the clay content increases with depth, and the material becomes more plastic and sticky.

Throughout, the type is variable in character, containing areas which, if large enough, would be mapped and separated into soils of three closely related series. The extent of the Orangeburg sandy loam within the county is small, a few small areas occurring in the Coastal Plain section. Like the coarser type, it is found on eroded slopes in conjunction with similarly textured soils of the Norfolk series. The areas are well drained and are subject to considerable damage by erosion.

The Orangeburg sandy loam is a comparatively productive soil and easy to cultivate. It gives good crops of cotton, corn, oats, forage crops, and peanuts. Pecan trees thrive on this type. The areas mapped are all cleared and cultivated.

GREENVILLE GRAVELLY LOAM.

The Greenville gravelly loam varies from a light-brown to reddish-brown, fine-textured, rather silty loam in the upper 6 inches to a friable, compact, and rather plastic clay, continuing to a depth of 36 inches or more. The clay varies widely in color, ranging from yellows to reds of lighter or darker shades and often of a purplish cast.

Areas of rather coarse texture and of gravelly soil occur throughout the type, with fragments of red ferruginous rock upon the surface, making it difficult to penetrate in places with the soil auger.

These fragments consist for the most part of hematite, argillaceous hematite, and quartz, ranging in size from small fragments to blocks a foot or more in diameter. The average size does not exceed 2 to 5 inches.

The Greenville gravelly loam is limited to a few areas in the Coastal Plain section of the county, the two largest areas lying just north of Grovetown. They consist of low, rounded hills or irregular ridges, from 25 to 100 feet above the surrounding country. These hills have usually smooth slopes.

The type is associated with certain hills of the Coastal Plain, which are composed largely of ferruginous rock and gravel with some interstitial soil material.

These hills are of no importance except for their timber growth of longleaf and shortleaf pine, with some scrubby blackjack and other oaks. While there is some land of fair quality in these hills, it is doubtful if there are any areas of sufficient size to be profitably cultivated.

BERZELIA SILT LOAM.

The surface 6 inches of the Berzelia silt loam consists of a dark-drab, rather heavy silt loam, with a soft, clammy feel. The subsoil to a depth of 36 inches consists of a fine material, kaolin or kaolinized feldspar, light drab in the upper part and yellowish and often mottled yellow and drab in the lower portions. Included in the areas of the type are low knolls or spots of silty coarse sandy loam similar to the Berzelia coarse sandy loam, but too small to map separately.

The Berzelia silt loam is of small extent, being limited to a narrow belt along Boggy Gut Creek, in the extreme southwestern part of the county. This belt extends back barely one-fourth of a mile from the creek, and is broken by swampy areas of its branches. It occupies a benchlike situation along this creek, the surface being flat to sloping and somewhat eroded.

The material of the Berzelia silt loam seems to be the same as the white clays of the region used for clay products and which have been described as Cretaceous in age.

The surface configuration permits good surface drainage over most of the type. The lower-lying areas are wet and crawfishy. It is a late soil, difficult to work and not very productive. The greater part of the type is more or less acid and needs applications of lime, which will also improve its structural condition. It is probably best suited to grass.

This type is of little importance. Very little of it is cleared and under cultivation. The main tree growth is shortleaf pine and gums, the latter found in the lower areas.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Berzelia silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
251819	Soil	1.0	1.8	1.4	4.6	6.3	41.8	43.5
251820	Subsoil	1.5	8.2	4.8	6.5	1.7	41.9	35.7

BERZELIA COARSE SANDY LOAM.

The surface soil of the Berzelia coarse sandy loam, to a depth of 8 to 12 inches, is a light-gray to drab coarse sandy loam. In places the soil contains enough silt and clay to give it a distinctly soft or loamy feel. Usually the type carries a considerable quantity of waterworn gravel, some angular rock fragments, which near the ferruginous hills are in part ferruginous sandstone and ferruginous gravel.

The subsoil is a dense yellow to salmon colored clay, in places tinged or slightly mottled with red. This clay carries considerable quantities of fragmentary rock, usually quartz. It is fairly plastic, having a smooth, soapy feel. Locally it is known as "chalky land" from its prevailingly light color.

The Berzelia coarse sandy loam is not an extensive soil type. It occurs in a number of isolated areas in the Coastal Plain section of the county. They are found at the heads of streams where a number of branches converge and for a short distance along the upper courses of these streams. The high areas have good surface drainage, but the depressions are wet and crawfishy. These lands need draining before they can be made to produce crops. The subsoil being close and uniform in structure, holds water well and even in times of drought is moist or wet. During wet seasons the crops suffer from excess moisture. They do better in moderately dry years, when average yields of the staple crops are obtained. The type occurs on small knolls along the streams and their slopes. The sandy surface represents material of the adjacent soils more or less mixed with the light colored clay, which seems to be the same as that mined in the region for the manufacture of brick. This is correlated by the Geological Survey of Georgia as of Cretaceous age.[1]

The type is considered a rather poor soil and generally undesirable. Its extent is so small as to make it unimportant. It was formerly covered by a timber growth of longleaf and shortleaf pine with some deciduous trees. Land values are low.

[1] See Bulletin No. 18, Geological Survey of Georgia, p. 199.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Berzelia coarse sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
251817	Soil	17.7	29.9	18.2	18.8	3.2	7.0	5.0
251818	Subsoil	20.9	26.3	11.6	10.4	1.7	14.7	14.5

CONGAREE SILT LOAM.

The Congaree silt loam, to a depth of 10 inches, is a brown to reddish-brown material ranging from silt loam to sandy loam, overlying lighter colored material which at a depth of 20 to 30 inches changes to a fine to coarse loamy sand. The average texture of the type is a silt loam, but along the stream banks it is sandier than farther back from the streams, owing to the assorting power of currents of varying velocities.

The Savannah River has built up a natural levee on its immediate banks, generally somewhat higher than the bottoms back near the uplands. The levee is from 50 to 100 feet wide and usually composed of sands of varying texture. Along the creeks areas occur where the whole bottom is covered with a deposit of sand.

While bottoms occur along most of the streams, they are not as extensive nor as continous as along the Savannah. The largest occurrence of the Congaree silt loam is along the Savannah between Kiopee Creek and Bettys Branch, including Waltons Island.

The areas along the creeks and branches are flat and only a few feet above the stream beds. For the most part they are poorly drained and subject to annual overflow, though not swampy. Many of these bottoms were too small to map separately.

The bottoms along the Savannah are highly prized because of their productiveness, especially for corn, of which the yields range from 50 to 75 bushels or more per acre, without fertilization. The bottoms along the tributary creeks and branches also yield heavy crops of corn. Cotton goes too much to weed. The creek bottoms where cultivated are drained by open ditches.

A serious drawback to the utilization of bottom lands is their liability to overflow during the growing season, with a partial or total loss of the crops. Good creek bottoms enhance the value of the farms to which they belong. The tree growth is poplar, gum, and shortleaf pine, with some sycamore and other deciduous trees.

SWAMP.

The type known as Swamp includes the swampy areas common to most of the stream courses of the Coastal Plain section, where drainage is sluggish and the swampy condition persists the greater part of the year.

The material composing this soil type varies greatly. Usually the upper portions are black and mucky, overlying a compact drab-colored sand fairly coarse in texture. Occasionally sandy clay of the same color may be found within 2 or 3 feet of the surface.

The Swamp areas are small and unimportant. They extend up all the streams, but are in most cases narrow.

The predominant growth is gum, with some bay, swamp maple, slash pine, and a few other tree species. An undergrowth of swamp huckleberry, gallberry, and swamp grasses is characteristic.

The Swamp lands are of no present value, except for the pasturage they afford. Their position in most cases makes drainage difficult. Where this is possible the reclaimed areas would be of value for the production of such truck crops as celery, cabbage, and onions.

ROCK OUTCROP.

Several areas of Rock outcrop occur in the county, of which Heggie Rock, in the central part, is the largest and best known. Around it are several smaller areas. These consist of a coarse granite intrusion presenting an uneven bare rock surface, with no soil except in shallow basinlike depressions and crevices. These support a few trees, mostly cedar, but are of no value as farming lands.

In the Coastal Plain section a few Rock outcrop areas of small extent are mapped north of Berzelia. They consist of sand cemented with clay or kaolin, forming a sandstone designated by the State geological survey as the Altamaha sandstone. These areas have a little soil in places and support a light growth of pine. Like the other rock outcrops, they are nonagricultural and have no value.

SUMMARY.

Columbia County lies in the north-central part of Georgia, its eastern boundary being the Savannah River. Its area is approximately 313 square miles, or 200,320 acres. The county lies partly in the Piedmont Plateau and partly in the Atlantic Coastal Plain, the former division embracing about three-fourths of its area. The elevation ranges from 200 feet to 600 feet.

Drainage is through the Savannah River, flowing in a general northeast direction across the county.

Settlement of the area dates back to 1736, continuing steadily from that date until the Revolutionary War, when practically all of the available land had been taken up, much of it being held in large plantations. The census of 1910 gives the county a population of 12,328.

Good transportation facilities are offered by two railroads crossing the county, the Georgia Railroad and the Charleston & Western Carolina.

Cotton now occupies about one-half of the available improved land of the area. Corn ranks next, while forage crops are grown only on

small scattered areas. Some trucking is carried on in the Atlantic Coastal Plain section, or southern part of the county. Here watermelon growing is rapidly becoming one of the important industries.

The soils of the area were separated into 10 series, including 26 different types, exclusive of Swamp and Rock outcrop. These soil types form a part of three soil provinces, the Piedmont Plateau, the Atlantic Coastal Plain, and the River Flood Plains. Thirteen soil types in three series were mapped in the former division.

The Cecil series includes the strongest and most productive soils in the county.

The Appling soils are considered not quite equal to the Cecil series, but are made to produce average yields of staple crops.

The Iredell soils—three types—are of small extent and little importance. They are of low productiveness.

The Congaree silt loam occurs along the Savannah River and the minor streams of the Piedmont. It is a productive soil, giving good yields of corn, especially along the Savannah bottoms.

The Coastal Plain soils are sedimentary types. Of these the Norfolk series, comprising four soil types, is the most extensive. These soils are of low natural productivenes but give fair yields with fertilizers. They have a special value in the production of early truck crops.

The Tifton and Orangeburg series is represented each by two types. They are not extensive. Agriculturally they are strong productive soils and have a wide range in crop adaptation.

Two unimportant types in the Coastal Plain were mapped under the new name of Berzelia.

The Greenville gravelly loam occurs in small areas occupying the low rounded hills and ridges in the Coastal Plain section. While there is some land of fair quality in these hills it is doubtful if there are any areas of sufficient size to be profitably cultivated.

A type designated as the Bradley coarse sandy loam was separated and mapped. This is formed of sedimentary sand and gravel overlying residual clays of the Piedmont section.

All of the cultivated areas have been handled for many years under a one-crop system, which has resulted in the deterioration of the land. Only by the use of commercial fertilizers can the soil now be made to give average yields of the staple crops. The soils may be built up by crop rotation and the practice of green manuring.

Land values have advanced rapidly within the last few years, mainly as a result of the better prices for farm products.

There is marked need of a wider diversification of crops, with which the soils may be greatly improved.

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

U. S. DEPT OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF
CURTIS F. MARBUT, IN CHARGE SOIL SURVEY

SOIL MAP

GEORGIA
COLUMBIA COUNTY SHEET

SOIL PROFILE
(3 feet deep)

- Cecil coarse sandy loam — Csl / C
- Appling silt loam — Vfsl to Sil / C
- Csl / C — Gravelly phase
- Norfolk coarse sand — Cs
- Cecil sandy loam — Sl / C
- Norfolk sand — S
- Cecil fine sandy loam — Fsl / C
- Norfolk coarse sandy loam — Lcs / Csc
- Cecil very fine sandy loam — Vfsl / C
- Norfolk sandy loam — Ls to Sl / Sc
- Cecil clay loam — Sl to Cl / C
- Tifton coarse sandy loam — Csl / Sc
- Cl / C — Stony phase
- Tifton sandy loam — Sl / Sc
- Iredell stony loam — Fsl to L / C / Dr
- Orangeburg coarse sandy loam — Lcs / Sc
- Iredell coarse sandy loam — Fsl / C / Dr
- Orangeburg sandy loam — S to Ls / Sc
- Iredell fine sandy loam — Fsl / C / Dr
- Berzelia coarse sandy loam — Csl / S and K
- Appling coarse sand — Cs / Csl to Lcs / R
- Berzelia silt loam — Sil / K
- Appling coarse sandy loam — Cls to Csl / Csl to Sc
- Bradley coarse sandy loam — Lcs to Csl / C
- Appling sandy loam — Sl / Sl to Sc
- Greenville gravelly loam — L / Sc
- Appling fine sandy loam — Fsl / Fsc to C
- Congaree silt loam — Sil / Sil

LEGEND

Csl	Coarse sandy loam
C	Clay
Sl	Sandy loam
Fsl	Fine sandy loam
Vfsl	Very fine sandy loam
Cl	Clay loam
L	Loam
Dr	Decomposed rock
Lcs	Loamy coarse sand
R	Rock
Cls	Coarse loamy sand
Sc	Sandy clay
Fsc	Fine sandy clay
Sil	Silt loam
Cs	Coarse sand
S	Sand
Csc	Coarse sandy clay
Ls	Loamy sand
K	Kaolin

LEGEND

- Cecil coarse sandy loam — Cs
- Norfolk coarse sand — Nc
- Cs — Gravelly phase
- Norfolk sand — Ns
- Cecil sandy loam — Cl
- Norfolk coarse sandy loam — N
- Cecil fine sandy loam — Cf
- Norfolk sandy loam — Nl
- Cecil very fine sandy loam — Cv
- Tifton coarse sandy loam — Tc
- Cecil clay loam — Cc
- Tifton sandy loam — Ts
- Cc — Stony phase
- Orangeburg coarse sandy loam — Oc
- Iredell stony loam — Is
- Orangeburg sandy loam — Os
- Iredell coarse sandy loam — Ic
- Berzelia coarse sandy loam — B
- Iredell fine sandy loam — Il
- Berzelia silt loam — Bl
- Appling coarse sand — As
- Bradley coarse sandy loam — Bc
- Appling coarse sandy loam — Ac
- Greenville gravelly loam — G
- Appling sandy loam — Al
- Congaree silt loam — C
- Appling fine sandy loam — Af
- Swamp — S
- Appling silt loam — A
- Rock outcrop — R
- Stony areas
- Gravelly areas

Hugh H. Bennett, Inspector in charge Southern Division
Soils surveyed by Charles N. Mooney
and Arthur E. Taylor

Scale 1 inch = 1 mile

Field Operations
Bureau of Soils
1911